Modbus Register Map

Maestro Vigilante AQS

Document Type:	Modbus Register Map
Document Title:	*Maestro Vigilante AQI*
AQI02 Firmware Version:	4.x
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Document Revision History

Date	Release No.	Notes
May 5, 2013	1.0	Initial release
August 27, 2013	1.1	Added Analog Input and RTD input alarm bits
January 30, 2014	1.2	Added gas sensor types
January 20, 2015	1.3	Added PID Loop registers
February 13, 2015	1.4	Added time and group registers
April 10, 2015	1.4.1	Removed invalid gas sensor registers
April 16, 2015	1.4.2	Updated airflow diagnostic registers
May 31, 2015	1.4.3	Updated register descriptions
June 1, 2015	1.5	Added TWL, TWA, STEL
January 7, 2016	1.6	RTU - Remote Humidity Sensors
October 18, 2016	1.7	Metric / Imperial conversion, 32-bit status registers
February 14, 2017	1.8	2x RTU PTX, AD4 PID features: I/O, Reverse Acting
October 27, 2016	1.9	RTU – Dustmon registers

NOTE:

All Modbus registers are considered 16 Bit words with the exception of holding registers between 40500 to 40530.

New Feature:

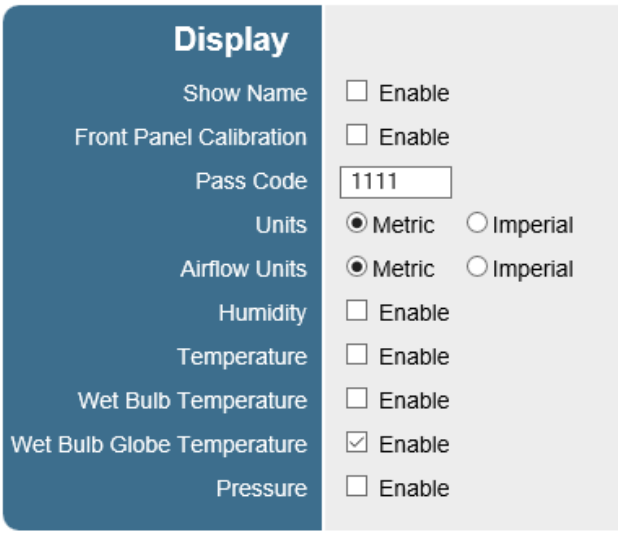
Starting from Vigilante Version 2.10, changing the unit settings in the display types will directly convert all 16 Bit word values written to the corresponding Modbus registers. In versions < 2.9 all Modbus registry values are only provided as metric units.

All 32 Bit words in the 500 registers are only provided as metric values.

Both unit settings will be metric by default. The airflow measurement units are independent of the station units allowing for alternate units of measure when required.

Units: Temperature, Wet Bulb, WBGT and Pressure

Airflow Units: Velocity, Volumetric and Mass Flow.



Display configuration settings located under **“Station -> Display”**

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Modbus Register Map

Maestro Vigilante AQS

1. Vigilante Modbus Specifications

1.1 Control Unit

1.1.1 Modbus Registers

Register	Function	R/W	Notes
00001	AD4 1 Discrete Out (coil) 1	R/W	
00002	AD4 1 Discrete Out (coil) 2	R/W	
00003	AD4 1 Discrete Out (coil) 3	R/W	
00004	AD4 1 Discrete Out (coil) 4	R/W	
00005	AD4 2 Discrete Out (coil) 1	R/W	
00006	AD4 2 Discrete Out (coil) 2	R/W	
00007	AD4 2 Discrete Out (coil) 3	R/W	
00008	AD4 2 Discrete Out (coil) 4	R/W	
00009	ADO 1 Discrete Out (coil) 1	R/W	
00010	ADO 1Discrete Out (coil) 2	R/W	
00011	ADO 1 Discrete Out (coil) 3	R/W	
00012	ADO 2 Discrete Out (coil) 1	R/W	
00013	ADO 2Discrete Out (coil) 2	R/W	
00014	ADO 2 Discrete Out (coil) 3	R/W	
10001	AD4 1 Discrete In 1	R/O	
10002	AD4 1 Discrete In 2	R/O	
10003	AD4 1 Discrete In 3	R/O	
10004	AD4 1 Discrete In 4	R/O	
10005	AD4 2 Discrete In 1	R/O	
10006	AD4 2 Discrete In 2	R/O	
10007	AD4 2 Discrete In 3	R/O	
10008	AD4 2 Discrete In 4	R/O	
	…		

40001	Version Info	R/O	AQI02 HW / SW revision
40002	Air Flow 1 Alarm	R/O	See Section 1.1.2
40003	Air Flow 1 Velocity	R/O	m/s or ft/min (x 10)
40004	Air Flow 1 Volumetric	R/O	m3/s or kcfm (x 10)
40005	Air Flow 1 Mass	R/O	kg/s or lb/min
40006	Air Flow 2 Alarm	R/O	See Section 1.1.2
40007	Air Flow 2 Velocity	R/O	m/s or ft/min (x 10)
40008	Air Flow 2 Volumetric	R/O	m3/s or kcfm (x 10)
40009	Air Flow 2 Mass	R/O	kg/s or lb/min
40010	Air Flow 3 Alarm	R/O	See Section 1.1.2
40011	Air Flow 3 Velocity	R/O	m/s or ft/min (x 10)
40012	Air Flow 3 Volumetric	R/O	m3/s or kcfm (x 10)
40013	Air Flow 3 Mass	R/O	kg/s or lb/min
40014	Air Flow 4 Alarm	R/O	See Section 1.1.2
40015	Air Flow 4 Velocity	R/O	m/s or ft/min (x 10)
40016	Air Flow 4 Volumetric	R/O	m3/s or kcfm (x 10)
40017	Air Flow 4 Mass	R/O	kg/s or lb/min
40018	Gas 1 Alarm	R/O	See Section 1.1.3
40019	Gas 1 Type	R/O	See Section 1.1.8
40020	Gas 1 Value	R/O	Units x 10
40021	Gas 1 Unit	R/O	See Section 1.1.3
40022	Gas 2 Alarm	R/O	See Section 1.1.3
40023	Gas 2 Type	R/O	See Section 1.1.8
40024	Gas 2 Value	R/O	Units x 10
40025	Gas 2 Unit	R/O	See Section 1.1.3
40026	Gas 3 Alarm	R/O	See Section 1.1.3
40027	Gas 3 Type	R/O	See Section 1.1.8
40028	Gas 3 Value	R/O	Units x 10
40029	Gas 3 Unit	R/O	See Section 1.1.3
40030	Gas 4 Alarm	R/O	See Section 1.1.3
40031	Gas 4 Type	R/O	See Section 1.1.8
40032	Gas 4 Value	R/O	Units x 10
40033	Gas 4 Unit	R/O	See Section 1.1.3
40034	Gas 5 Alarm	R/O	See Section 1.1.3
40035	Gas 5 Type	R/O	See Section 1.1.8

40036	Gas 5 Value	R/O	Units x 10
40037	Gas 5 Unit	R/O	See Section 1.1.3
40038	Gas 6 Alarm	R/O	See Section 1.1.3
40039	Gas 6 Type	R/O	See Section 1.1.8
40040	Gas 6 Value	R/O	Units x 10
40041	Gas 6 Unit	R/O	See Section 1.1.3
40042	PTX 1 Value	R/O	mBar, InchesH2O (x 10)
40043	PTX 2 Value	R/O	mBar, InchesH2O (x 10)
	…		
40050	RH	R/O	% x 10
40051	Temperature	R/O	Deg C or Deg F (x 10)
40052	Pressure	R/O	kPa or mBar (x 10)
40053	Wet Bulb Temp	R/O	Deg C or Deg F (x 10)
40054	WBGT	R/O	Deg C or Deg F (x 10)
40055	AD4 1 AIN 1 Alarm	R/O	See Section 1.1.4
40056	AD4 1 AIN 1 Value	R/O	Engineering Units * 10
40057	AD4 1 AIN 2 Alarm	R/O	See Section 1.1.4
40058	AD4 1 AIN 2 Value	R/O	Engineering Units * 10
40059	AD4 1 AIN 3 Alarm	R/O	See Section 1.1.4
40060	AD4 1 AIN 3 Value	R/O	Engineering Units * 10
40061	AD4 1 AIN 4 Alarm	R/O	See Section 1.1.4
40062	AD4 1 AIN 4 Value	R/O	Engineering Units * 10
40063	AD4 1 AOUT 1	R/W	0 - 4095
40064	AD4 1 AOUT 2	R/W	0 - 4095
40065	AD4 1 AOUT 3	R/W	0 - 4095
40066	AD4 1 AOUT 4	R/W	0 - 4095
40067	AD4 1 Discrete Out	R/O	Bit status of all discrete outputs
40068	AD4 1 Discrete In	R/O	Bit status of all discrete inputs
40069	AD4 2 AIN 1 Alarm	R/O	See Section 1.1.4
40070	AD4 2 AIN 1 Value	R/O	Engineering Units * 10
40071	AD4 2 AIN 2 Alarm	R/O	See Section 1.1.4
40072	AD4 2 AIN 2 Value	R/O	Engineering Units * 10
40073	AD4 2 AIN 3 Alarm	R/O	See Section 1.1.4
40074	AD4 2 AIN 3 Value	R/O	Engineering Units * 10

40075	AD4 2 AIN 4 Alarm	R/O	See Section 1.1.4
40076	AD4 2 AIN 4 Value	R/O	Engineering Units * 10
40077	AD4 2 AOUT 1	R/W	0 - 4095
40078	AD4 2 AOUT 2	R/W	0 - 4095
40079	AD4 2 AOUT3	R/W	0 - 4095
40080	AD4 2 AOUT 4	R/W	0 - 4095
40081	AD4 2 Discrete Out	R/O	Bit status of all discrete outputs
40082	AD4 2 Discrete In	R/O	Bit status of all discrete inputs
40083	T12 1 RTD 1 Alarm	R/O	See Section 1.1.5
40084	T12 1 RTD 1 Value	R/O	Deg C or Deg F (x 10)
40085	T12 1 RTD 2 Alarm	R/O	See Section 1.1.5
40086	T12 1 RTD 2 Value	R/O	Deg C or Deg F (x 10)
40087	T12 1 RTD 3 Alarm	R/O	See Section 1.1.5
40088	T12 1 RTD 3 Value	R/O	Deg C or Deg F (x 10)
40089	T12 1 RTD 4 Alarm	R/O	See Section 1.1.5
40090	T12 1 RTD 4 Value	R/O	Deg C or Deg F (x 10)
40091	T12 1 RTD 5 Alarm	R/O	See Section 1.1.5
40092	T12 1 RTD 5 Value	R/O	Deg C or Deg F (x 10)
40093	T12 1 RTD 6 Alarm	R/O	See Section 1.1.5
40094	T12 1 RTD 6 Value	R/O	Deg C or Deg F (x 10)
40095	T12 1 RTD 7 Alarm	R/O	See Section 1.1.5
40096	T12 1 RTD 7 Value	R/O	Deg C or Deg F (x 10)
40097	T12 1 RTD 8 Alarm	R/O	See Section 1.1.5
40098	T12 1 RTD 8 Value	R/O	Deg C or Deg F (x 10)
40099	T12 1 RTD 9 Alarm	R/O	See Section 1.1.5
40100	T12 1 RTD 9 Value	R/O	Deg C or Deg F (x 10)
40101	T12 1 RTD 10 Alarm	R/O	See Section 1.1.5
40102	T12 1 RTD 10 Value	R/O	Deg C or Deg F (x 10)
40103	T12 1 RTD 11 Alarm	R/O	See Section 1.1.5
40104	T12 1 RTD 11 Value	R/O	Deg C or Deg F (x 10)
40105	T12 1 RTD 12 Alarm	R/O	See Section 1.1.5
40106	T12 1 RTD 12Value	R/O	Deg C or Deg F (x 10)
40107	T12 2 RTD 1 Alarm	R/O	See Section 1.1.5
40108	T12 2 RTD 1 Value	R/O	Deg C or Deg F (x 10)
40109	T12 2 RTD 2 Alarm	R/O	See Section 1.1.5

40110	T12 2 RTD 2 Value	R/O	Deg C or Deg F (x 10)
40111	T12 2 RTD 3 Alarm	R/O	See Section 1.1.5
40112	T12 2 RTD 3 Value	R/O	Deg C or Deg F (x 10)
40113	T12 2 RTD 4 Alarm	R/O	See Section 1.1.5
40114	T12 2 RTD 4 Value	R/O	Deg C or Deg F (x 10)
40115	T12 2 RTD 5 Alarm	R/O	See Section 1.1.5
40116	T12 2 RTD 5 Value	R/O	Deg C or Deg F (x 10)
40117	T12 2 RTD 6 Alarm	R/O	See Section 1.1.5
40118	T12 2 RTD 6 Value	R/O	Deg C or Deg F (x 10)
40119	T12 2 RTD 7 Alarm	R/O	See Section 1.1.5
40120	T12 2 RTD 7 Value	R/O	Deg C or Deg F (x 10)
40121	T12 2 RTD 8 Alarm	R/O	See Section 1.1.5
40122	T12 2 RTD 8 Value	R/O	Deg C or Deg F (x 10)
40123	T12 2 RTD 9 Alarm	R/O	See Section 1.1.5
40124	T12 2 RTD 9 Value	R/O	Deg C or Deg F (x 10)
40125	T12 2 RTD 10 Alarm	R/O	See Section 1.1.5
40126	T12 2 RTD 10 Value	R/O	Deg C or Deg F (x 10)
40127	T12 2 RTD 11 Alarm	R/O	See Section 1.1.5
40128	T12 2 RTD 11 Value	R/O	Deg C or Deg F (x 10)
40129	T12 2 RTD 12 Alarm	R/O	See Section 1.1.5
40130	T12 2 RTD 12 Value	R/O	Deg C or Deg F (x 10)
40131	Dustmon Alarm	R/O	See Section 1.16
40132	Dustmon Value	R/O	Scaled, % (x10)
40133	ADO 1 Analog Out	R/W	0 - 4095
40134	ADO 2 Analog Out	R/W	0 - 4095
40135	Gas 1 STEL	R/O	Short Term Exposure Limit
40136	Gas 1 TWA	R/O	Time Weighted Average (shift)
40137	Gas 2 STEL	R/O	Short Term Exposure Limit
40138	Gas 2 TWA	R/O	Time Weighted Average (shift)
40139	Gas 3 STEL	R/O	Short Term Exposure Limit
40140	Gas 3 TWA	R/O	Time Weighted Average (shift)
40141	Gas 4 STEL	R/O	Short Term Exposure Limit
40142	Gas 4 TWA	R/O	Time Weighted Average (shift)
40143	Gas 5 STEL	R/O	Short Term Exposure Limit
40144	Gas 5 TWA	R/O	Time Weighted Average (shift)

40145	Gas 6 STEL	R/O	Short Term Exposure Limit
40146	Gas 6 TWA	R/O	Time Weighted Average (shift)
	…		
40151	AD4 1 PID 1 Setpoint	R/W	Engineering Units
40152	AD4 1 PID 1 Feedback	R/O	Engineering Units
40153	AD4 1 PID 1 Output	R/O R/W	0 – 100% Auto 0 – 100% Manual
40154	AD4 1 PID 1 Control	R/W	See Section 1.1.9
	…		
40155	AD4 1 PID 2 Setpoint	R/W	Engineering Units
40156	AD4 1 PID 2 Feedback	R/O	Engineering Units
40157	AD4 1 PID 2 Output	R/O R/W	0 – 100% Auto 0 – 100% Manual
40158	AD4 1 PID 2 Control	R/W	See Section 1.1.9
	…		
40159	AD4 1 PID 1 ‘P’	R/W	0 – 100 % *(Default = 10)*
40160	AD4 1 PID 1 ‘I’	R/W	0 – 100 % *(Default = 10)*
40161	AD4 1 PID 1 ‘D’	R/W	0 – 100 % *(Default = 0)*
40162	AD4 1 PID 1 Dead band	R/W	0 – 100 % *(Default = 5)*
40163	AD4 1 PID 2 ‘P’	R/W	0 – 100 % *(Default = 10)*
40164	AD4 1 PID 2 ‘I’	R/W	0 – 100 % *(Default = 10)*
40165	AD4 1 PID 2 ‘D’	R/W	0 – 100 % *(Default = 0)*
40166	AD4 1 PID 2 Dead band	R/W	0 – 100 % *(Default = 5)*
	…		

40171	AD4 2 PID 1 Setpoint	R/W	Engineering Units
40172	AD4 2 PID 1 Feedback	R/O	Engineering Units
40173	AD4 2 PID 1 Output	R/O R/W	0 – 100% Auto 0 – 100% Manual
40174	AD4 2 PID 1 Control	R/W	See Section 1.1.9
	…		
40175	AD4 2 PID 2 Setpoint	R/W	Engineering Units
40176	AD4 2 PID 2 Feedback	R/O	Engineering Units
40177	AD4 2 PID 2 Output	R/O R/W	0 – 100% Auto 0 – 100% Manual
40178	AD4 2 PID 2 Control	R/W	See Section 1.1.9
	…		
40179	AD4 2 PID 1 ‘P’	R/W	0 – 100 % *(Default = 10)*
40180	AD4 2 PID 1 ‘I’	R/W	0 – 100 % *(Default = 10)*
40181	AD4 2 PID 1 ‘D’	R/W	0 – 100 % *(Default = 0)*
40182	AD4 2 PID 1 Dead band	R/W	0 – 100 % *(Default = 5)*
40183	AD4 2 PID 2 ‘P’	R/W	0 – 100 % *(Default = 10)*
40184	AD4 2 PID 2 ‘I’	R/W	0 – 100 % *(Default = 10)*
40185	AD4 2 PID 2 ‘D’	R/W	0 – 100 % *(Default = 0)*
40186	AD4 2 PID 2 Dead band	R/W	0 – 100 % *(Default = 5)*
	…		
40191	ADO 1 Status	R/O	Bit 0 = Not configured Bit 1 = Normal Operation Bit 2 = No Communication Bit 3 = Over Range
40192	ADO 2 Status	R/O	Bit 0 = Not configured Bit 1 = Normal Operation Bit 2 = No Communication Bit 3 = Over Range
40193	PTX 1 Status	R/O	Bit 0 = Not configured Bit 1 = Normal Operation Bit 2 = No Communication
40194	PTX 2 Status	R/O	Bit 0 = Not configured Bit 1 = Normal Operation Bit 2 = No Communication
	…		

40201	AF1 Sensor 1 Status	R/O	See Section 1.1.2
40202	AF1 Sensor 1 Pulse Quality	R/O	0 – 100 %
40203	AF1 Sensor 1 Transit Time	R/O	uS
40204	AF1 Sensor 1 Voltage	R/O	Vdc x 10
40205	AF1 Sensor 1 Temp	R/O	Deg C x 10
40206	AF1 Sensor 2 Status	R/O	See Section 1.1.2
40207	AF1 Sensor 2 Pulse Quality	R/O	0 – 100 %
40208	AF1 Sensor 2 Transit Time	R/O	uS
40209	AF1 Sensor 2 Voltage	R/O	Vdc x 10
40210	AF1 Sensor 2 Temp	R/O	Deg C x 10
	...		
40221	AF2 Sensor 1 Status	R/O	See Section 1.1.2
40222	AF2 Sensor 1 Pulse Quality	R/O	0 – 100 %
40223	AF2 Sensor 1 Transit Time	R/O	uS
40224	AF2 Sensor 1 Voltage	R/O	Vdc x 10
40225	AF2 Sensor 1 Temp	R/O	Deg C x 10
40226	AF2 Sensor 2 Status	R/O	See Section 1.1.2
40227	AF2 Sensor 2 Pulse Quality	R/O	0 - 100%
40228	AF2 Sensor 2 Transit Time	R/O	uS
40229	AF2 Sensor 2 Voltage	R/O	Vdc x 10
40230	AF2 Sensor 2 Temp	R/O	Deg C or Deg F (x 10)
	...		
40241	AF3 Sensor 1 Status	R/O	See Section 1.1.2
40242	AF3 Sensor 1 Pulse Quality	R/O	0 - 100%
40243	AF3 Sensor 1 Transit Time	R/O	uS
40244	AF3 Sensor 1 Voltage	R/O	Vdc x 10
40245	AF3 Sensor 1 Temp	R/O	Deg C or Deg F (x 10)
40246	AF3 Sensor 2 Status	R/O	See Section 1.1.2
40247	AF3 Sensor 2 Pulse Quality	R/O	0 - 100%
40248	AF3 Sensor 2 Transit Time	R/O	uS
40249	AF3 Sensor 2 Voltage	R/O	Vdc x 10
40250	AF3 Sensor 2 Temp	R/O	Deg C or Deg F (x 10)
	...		

40261	AF4 Sensor 1 Status	R/O	See Section 1.1.2
40262	AF4 Sensor 1 Pulse Quality	R/O	0 - 100%
40263	AF4 Sensor 1 Transit Time	R/O	uS
40264	AF4 Sensor 1 Voltage	R/O	Vdc x 10
40265	AF4 Sensor 1 Temp	R/O	Deg C or Deg F (x 10)
40266	AF4 Sensor 2 Status	R/O	See Section 1.1.2
40267	AF4 Sensor 2 Pulse Quality	R/O	0 - 100%
40268	AF4 Sensor 2 Transit Time	R/O	uS
40269	AF4 Sensor 2 Voltage	R/O	Vdc x 10
40270	AF4 Sensor 2 Temp	R/O	Deg C or Deg F (x 10)
	...		
40301	Gas Sensor 1 Status	R/O	(Internal Use Only)
40302	Gas Sensor 1 Command	R/W	(Internal Use Only)
40303	Gas Sensor 1 Temp	R/O	Deg C or Deg F (x 10)
40304	Gas Sensor 1 Span Gas	R/O	Integer value (sensor specific)
40305	Gas Sensor 1 Cal Year	R/O	0 - 99
40306	Gas Sensor 1 Cal Month	R/O	0 - 12
40307	Gas Sensor 1 Cal Day	R/O	Monthly specific
40308	Gas Sensor 1 Cal Timer	R/O	(Internal Use Only)
	...		
40311	Gas Sensor 2 Status	R/O	(Internal Use Only)
40312	Gas Sensor 2 Command	R/W	(Internal Use Only)
40313	Gas Sensor 2 Temp	R/O	Deg C or Deg F (x 10)
40314	Gas Sensor 2 Span Gas	R/O	Integer value (sensor specific)
40315	Gas Sensor 2 Cal Year	R/O	0 - 99
40316	Gas Sensor 2 Cal Month	R/O	0 - 12
40317	Gas Sensor 2 Cal Day	R/O	Monthly specific
40318	Gas Sensor 2 Cal Timer	R/O	(Internal Use Only)
	...		

40321	Gas Sensor 3 Status	R/O	(Internal Use Only)
40322	Gas Sensor 3 Command	R/W	(Internal Use Only)
40323	Gas Sensor 3 Temp	R/O	Deg C or Deg F (x 10)
40324	Gas Sensor 3 Span Gas	R/O	Integer value (sensor specific)
40325	Gas Sensor 3 Cal Year	R/O	0 - 99
40326	Gas Sensor 3 Cal Month	R/O	0 - 12
40327	Gas Sensor 3 Cal Day	R/O	Monthly specific
40328	Gas Sensor 3 Cal Timer	R/O	(Internal Use Only)
	...		
40331	Gas Sensor 4 Status	R/O	(Internal Use Only)
40332	Gas Sensor 4 Command	R/W	(Internal Use Only)
40333	Gas Sensor 4 Temp	R/O	Deg C or Deg F (x 10)
40334	Gas Sensor 4 Span Gas	R/O	Integer value (sensor specific)
40335	Gas Sensor 4 Cal Year	R/O	0 - 99
40336	Gas Sensor 4 Cal Month	R/O	0 - 12
40337	Gas Sensor 4 Cal Day	R/O	Monthly specific
40338	Gas Sensor 4 Cal Timer	R/O	(Internal Use Only)
	...		
40341	Gas Sensor 5 Status	R/O	(Internal Use Only)
40342	Gas Sensor 5 Command	R/W	(Internal Use Only)
40343	Gas Sensor 5 Temp	R/O	Deg C or Deg F (x 10)
40344	Gas Sensor 5 Span Gas	R/O	Integer value (sensor specific)
40345	Gas Sensor 5 Cal Year	R/O	0 - 99
40346	Gas Sensor 5 Cal Month	R/O	0 - 12
40347	Gas Sensor 5 Cal Day	R/O	Monthly specific
40348	Gas Sensor 5 Cal Timer	R/O	(Internal Use Only)
	...		

40351	Gas Sensor 6 Status	R/O	(Internal Use Only)
40352	Gas Sensor 6 Command	R/W	(Internal Use Only)
40353	Gas Sensor 6 Temp	R/O	Deg C or Deg F (x 10)
40354	Gas Sensor 6 Span Gas	R/O	Integer value (sensor specific)
40355	Gas Sensor 6 Cal Year	R/O	0 - 99
40356	Gas Sensor 6 Cal Month	R/O	0 - 12
40357	Gas Sensor 6 Cal Day	R/O	Monthly specific
40358	Gas Sensor 6 Cal Timer	R/O	(Internal Use Only)
	...		
40361	RRH #1 Humidity	R/O	% x 10
40362	RRH #1 Pressure	R/O	kPa or mBar (x 10)
40363	RRH #1 Temp	R/O	Deg C or Deg F (x 10)
40364	RRH #1 Wet Bulb	R/O	Deg C or Deg F (x 10)
40365	RRH #1 WBGT	R/O	Deg C or Deg F (x 10)
	...		
40371	RRH #2 Humidity	R/O	% x 10
40372	RRH #2 Pressure	R/O	kPa or mBar (x 10)
40373	RRH #2 Temp	R/O	Deg C or Deg F (x 10)
40374	RRH #2 Wet Bulb	R/O	Deg C or Deg F (x 10)
40375	RRH #2 WBGT	R/O	Deg C or Deg F (x 10)
	...		
40381	Time of Day - Year	R/W	0 - 99
40382	Time of Day - Month	R/W	0 - 12
40383	Time of Day - Day	R/W	Monthly Specific
40384	Time of Day - Hour	R/W	0 - 24
40385	Time of Day - Minute	R/W	0 - 59
40386	Time of Day - Second	R/W	0 - 59

	... 32-Bit Registers…		
40501	Air Flow 1 Velocity High Word	R/O	m/s, floating point
40502	Air Flow 1 Velocity Low Word	R/O	
40503	Air Flow 1 Volumetric High Word	R/O	m3/s, floating point
40504	Air Flow 1 Volumetric Low Word	R/O	
40505	Air Flow 1 Mass High Word	R/O	kg/s, floating point
40506	Air Flow 1 Mass Low Word	R/O	
40507	Air Flow 2 Velocity High Word	R/O	m/s, floating point
40508	Air Flow 2 Velocity Low Word	R/O	
40509	Air Flow 2 Volumetric High Word	R/O	m3/s, floating point
40510	Air Flow 2 Volumetric Low Word	R/O	
40511	Air Flow 2 Mass High Word	R/O	kg/s, floating point
40512	Air Flow 2 Mass Low Word	R/O	
40513	Dry Bulb Temp High Word	R/O	Deg C, floating point
40514	Dry Bulb Temp Low Word	R/O	
40515	Wet Bulb Temp High Word	R/O	Deg C, floating point
40516	Wet Bulb Temp Low Word	R/O	
40517	Humidity High Word	R/O	% RH, floating point
40518	Humidity Low Word	R/O	

40519	Barometric Pressure High Word	R/O	kPa, floating point
40520	Barometric Pressure Low Word	R/O	
40521	Gas 1 High Word	R/O	PPM or %, floating point
40522	Gas 1 Low Word	R/O	
40523	Gas 2 High Word	R/O	PPM or %, floating point
40524	Gas 2 Low Word	R/O	
40525	Gas 3 High Word	R/O	PPM or %, floating point
40526	Gas 3 Low Word	R/O	
40527	Gas 4 High Word	R/O	PPM or %, floating point
40528	Gas 4 Low Word	R/O	
40529	Peripheral Devices High Word	R/O	See Section 1.1.7
40530	Peripheral Devices Low Word	R/O	

Note:

All 32-bits registers in the 500's are only provided in metric units.

Imperial conversions will need to be calculated externally.

1.1.2 Airflow Register Definitions

Airflow Alarm Bits (16-Bit)

Bit 0	High Airflow Alarm
Bit 1	High Airflow Warning
Bit 2	Low Airflow Warning
Bit 3	Low Airflow Alarm
Bit 8	Sensor Failure
Bit 9	Sensor Blocked
Bit 10	Sensor Misaligned

Airflow Sensor Status Bits (16-Bit)

Bit 0	Sensor Failure
Bit 1	Sensor Blocked
Bit 2	Sensor Misaligned
Bit 3	Low Sensor Voltage (< 8 VDC)

1.1.3 Gas Sensor Register Definitions

Gas Sensor Alarm Bits (16-Bit)

Bit 0	High Gas Alarm
Bit 1	High Gas Warning
Bit 2	Low Gas Warning
Bit 3	Low Gas Alarm
Bit 4	Low Temperature Warning (<= -10 Deg C or 14 Deg F)
Bit 8	Sensor End of Life
Bit 9	Sensor Expired
Bit 10	Span Calibration Fault
Bit 11	Zero Calibration Fault
Bit 12	Unknown Fault

Gas Sensor Engineering Units (16-Bit)

0	NONE
1	% LEL
2	%
3	PPM
4	% LEL * 10
5	% * 10
6	PPM * 10
7	% LEL * 100
8	% * 100
9	PPM * 100

Gas Sensor Status Bits (16-Bit)

1	Normal Operation
2	Cal Fault
3	Zero Fault
4	
5	Sensor End of life
6	Sensor Expired
7	Unknown Fault
8	
9	In Zero Cal Mode
10	In Span Cal Mode
11	
12	
13	
14	
15	In Zero Initialization Mode

1.1.4 Analog Input Alarm Definitions

Analog Input Alarm Bits (16-Bit)

Bit 0	High Alarm
Bit 1	High Warning
Bit 2	Low Warning
Bit 3	Low Alarm
Bit 8	Open Loop (low current)
Bit 9	Over current

1.1.5 RTD Input Register Definitions

RTD Input Alarm Bits (16-Bit)

Bit 0	High Temperature Alarm
Bit 1	High Temperature Warning
Bit 2	Low Temperature Warning
Bit 3	Low Temperature Alarm
Bit 8	Open circuit
Bit 9	Short Circuit

1.1.6 Dustmon Register Definitions

Dustmon Alarm Bits (16-Bit)

Bit 0	Fan
Bit 1	Humidity

1.1.7 Peripheral Register Definitions

Peripheral Status Bits (32-Bit)

LOW WORD	Bit 0	Airflow System #1
	Bit 1	Airflow System #2
	Bit 2	Airflow System #3
	Bit 3	Airflow System #4
	Bit 4	Gas Sensor #1
	Bit 5	Gas Sensor #2
	Bit 6	Gas Sensor #3
	Bit 7	Gas Sensor #4
	Bit 8	Gas Sensor #5
	Bit 9	Gas Sensor #6
	Bit 10	AD4 #1
	Bit 11	AD4 #2
	Bit 12	RTD12 #1
	Bit 13	RTD12 #2
	Bit 14	RRH #1
	Bit 15	RRH #2
HIGH WORD	Bit 16	ADO #1
	Bit 17	ADO #2
	Bit 18	PTX #1
	Bit 19	PTX #2
	Bit 20	Dustmon

Note:

The corresponding bit will enable if a device is configured and is now disconnected.

(By default, all bits read a value of zero.)

1.1.8 Gas Sensor Register Definitions

Gas Types

1	CO 100 PPM, 50 PPM Span Gas
2	CO 500 PPM, 250 PPM Span Gas
3	CO 1000 PPM, 500 PPM Span Gas
4	NO2 10.0 PPM, 5.0 PPM Span Gas
5	NO 100 PPM, 50 PPM Span Gas
6	NO 500 PPM, 250 PPM Span Gas
7	NO 1000 PPM, 500 PPM Span Gas
8	O2 25%, 20.9 % Span Gas
9	H2S 50 PPM, 25 PPM Span Gas
10	H2S 100 PPM, 50 PPM Span Gas
11	SO2 10PPM, 5 PPM Span Gas
12	SO2 1000 PPM, 500 PPM Span Gas
13	CLO2 3.0 PPM, 1.0 PPM
14	CL2 5.0 PPM, 2.0 PPM
15	NH3 100 PPM, 50 PPM Span Gas
16	CO2 0.50%, 0.25% Span Gas
17	CO2 2.00%, 1.00% Span Gas
18	CO2 5%, 2.50% Span Gas
19	LEL, 100%, Methane (CH4)
20	LEL, 100%, Propane (C3H8)
21	HCN 10 PPM, 5.0 PPM Span Gas

1.1.9 PID Control & Status Bits

PID Controls Status Bits (16-Bit)		
Bit 0	R/O	Remote = 1 / Local = 0
Bit 1	R/W	Auto = 1 / Manual = 0
Bit 2	R/W	Suspend = 1 / Run = 0
Bit 12	R/O	Setpoint Failure
Bit 13	R/O	Feedback Failure

Testing Notes:

When validating communication timeouts with a 3rd party application, ensure not to force close the protocol socket otherwise the timeout will not get flagged. To simulate a network interruption, disconnect the Ethernet cord from your PC and wait for the timeout to take effect.

Polling timeout value is defaulted to 20000ms (20sec).

2. Vigilante Modbus Communications Test

The Vigilante controller board communicates natively over Modbus TCP/IP. If the device being used to collect data is of a different protocol type, then you may require a protocol converter to allow proper communication between devices.

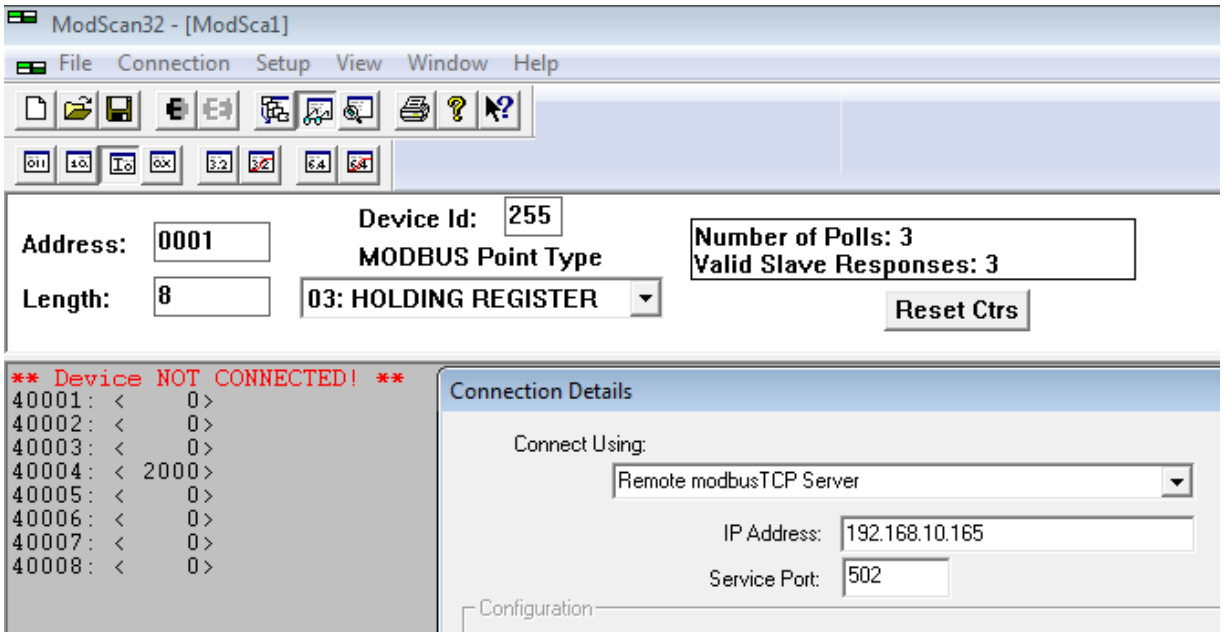
By default the Vigilante is configured with DHCP enabled allowing the device to request an IP address on the attached network assuming this feature is already available. Should the request for an IP address be denied, the default IP address will be set to ***169.254.1.2***.

Begin by testing a Modbus connection using ModScan32 to test and validate registers. A trial free version is available online for download. Before trying to connect with this program make sure to turn polling off on your PLC or SCADA program as only one polling device is supported.

Start by creating an new connection (Remote modbus TCP Server).
Enter the IP address of the module to connect to.

Example setup:

Starting address: 1
Length: 8
Device ID: 255
Modbus Point Type: [03: Holding Register]



3. Default Settings

3.1 Factory Default Settings

The Vigilante is provided from factory with DHCP enabled by default.

DHCP Slave:	Enabled
IP Address:	169.254.1.2 (DHCP failover)
Subnet:	255.255.255.0
Modbus Timeout:	2000ms

3.2 Device Failure Values

On disconnection of each sensor, the measured value will be forced to -99.9 until a working sensor has been affixed in its place.

- Gas sensor will be forced to -99.9.
- Pressure sensor will be forced to -99.9
- Temperature sensor will be forced to -99.9
- Dustmon will be forced to -99.9
- Differential pressure sensor will be forced to -99.9
- Airflow sensors are an exception which can be assigned to hold last value, or fail to zero